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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,740	09/30/2005	Alexander Ralph Beeck	2002P19478WOUS	4282

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SIEMENS CORPORATION
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EXAMINER	
SANDERS, JAMES M	

ART UNIT	PAPER NUMBER
1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/551,740	BEECK ET AL.	
	Examiner	Art Unit	
	JAMES SANDERS	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 August 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17,18 and 20-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17,18 and 20-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 September 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This is a non-final Office action in response to a RCE filed 8/6/09, in which claims 17 and 27 were amended.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 17-18, 20-26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deckard (US 4863538, already of record), further in view of Sachs et al (US 5340656), and further in view of Lewis et al (US 5837960, already of record).

For claim 17, Deckard teaches a process for producing a shaped object from a powder bed, comprising: preparing a powder bed having a first powder mix in a first

region and forming a first region of the shaped object by a first laser sintering of the first powder mix (Figs. 1 & 2, cl 5 ln 64 to cl 6, ln 2).

Deckard does not teach a second powder mix in a second region, the first and second powder mixes differing from each other in at least one of chemical composition and powder particle size distribution, and forming a second region of the shaped object integral with the first region by a second laser sintering of the second powder mix.

However, in the same field of endeavor pertaining to producing a shaped object from a powder bed, Sachs et al teach a second powder mix in a second region, the first and second powder mixes differing from each other in at least one of chemical composition and powder particle size distribution (cl 11 lns 15-20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Sachs et al with those of Deckard for benefit of producing shaped objects with regions of different materials.

Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a second region of the shaped object integral with the first region by a second laser sintering of the second powder mix, since one having ordinary skill in the art at the time the invention was made would recognize this limitation as nothing more than the duplication of parts for a multiple effect and could seek the benefit of producing shaped objects with regions formed of different materials. Please see MPEP 2144.04 (VI) and In re Harza, 274 F.2d 669, 671, 124 USPQ 378, 380 (CCPA 1960) for further details.

The previous combination does not teach the forming of at least one of the first and second regions comprises controlling the respective laser sintering step to provide different material properties in the first and second regions of the shaped object.

However, in a related field of endeavor pertaining to producing a shaped object from a powder with directed light, Lewis et al teach the forming of at least one of the first and second regions comprises controlling the respective laser sintering step to provide different material properties in the first and second regions of the shaped object (cl 4 lns 20-21 i.e. Another object is to produce articles having variable density, and cl 22 lns 1-8 i.e. Decreasing laser power results in less melting of the powder, thus reducing density, and cl 21 lns 14-22 i.e. It is expected that smoother surfaces will be attained by use of powder of smaller size and by reducing the size of the powder spot. Rough surfaces might also be smoothed by laser ablation, using the laser in a pulsed mode to remove small amounts of material, or by passing the laser beam over the surface in order to melt a very thin surface layer). Examiner points out that as densification is controlled it is inherent that porosity is also controlled and vice versa. Finally, as cited above, Lewis et al teach that the melting is not necessarily complete and Examiner considers that the incomplete melting is equivalent to “sintering.”

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lewis et al with those of the previous combination for benefit of producing shaped objects with regions of more widely varying different material properties.

For claim 18, the previous combination does not teach a ceramic mold is formed.

However, Lewis et al teach a process for producing a ceramic shaped object from ceramic powder (cl 1 lns 21-22 i.e. The present invention may be used to produce articles of any material which is obtainable in the form of a powder, and cl 21 lns 40-44 i.e. For example, turbine blades…might be fabricated…as the tip portion of the blade is formed, using an abrasion resistant material, such as carbide, boride…, and cl 21 lns 56-57 i.e. a hacksaw blade may be coated with tungsten carbide in the toothed section of the blade). Lewis et al do not explicitly teach a ceramic mold is formed, but they do teach fabrication of dies (cl 4 lns 8-9) and fabrication of fixtures for use in conventional high-volume production of articles (cl 4 lns 9-10) and since a mold is an alternative for a die and because a mold can be used many times, fabrication of a mold having regions with dissimilar properties would have been obvious to one having ordinary skill in the art at the time the invention was made.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lewis et al with those of the previous combination for benefit of producing a particular kind of shaped object with recognized utility for repeated production of articles.

For claim 20, further regarding the forming of at least one of the first and second regions comprises controlling the respective laser sintering step to provide different material properties in the first and second regions of the shaped object taught as obvious by Lewis et al above, Lewis et al also teach controlling a laser beam generated during the first and second laser sintering processes to produce a different sintering temperature over the first and second regions of the object creating a different degree of

densification in the first and second regions of the shaped object. (cl 22 lns 1-5 i.e. An article whose density varies, that is, has different densities at different locations, may be formed by varying laser power…Decreasing laser power results in less melting of the powder, thus reducing density). It would be inherent that areas subjected to different laser powers would have different temperatures. Also, Lewis et al teach different laser power levels for each material based on melting points (cl 17 lns 17-20).

For claim 21, Deckard teaches post formation treatments including heat treatment for the objects produced (cl 6 ln 55 to cl 7 ln 2 i.e. some type of parts may require certain material properties which can be achieved by heat treating).

Also, Lewis et al teach an operative principle that the amount of heat applied influences density (cl 22 lns 7-8 i.e. The operative principle is that a reduction in heat input per unit of mass causes a reduction in density) so that an increase in heat input per unit of mass causes an increase in density. Further, Lewis et al teach an increased density of hot-pressed powder compared to cold-pressed powder (cl 13 lns 9-11 i.e. that of cold-pressed powder is usually about 50 to 55% (of theoretical density of the material) and that of hot-pressed powder is usually 80% or more).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lewis et al with those of the previous combination for benefit of achieving further densification by hot isostatic pressing.

For claim 22, Deckard teaches accessing a computerized representation of the object and using the computerized representation to control the process for producing the shaped object (cl 6 lns 36-49).

For claims 23 and 24, further regarding a ceramic mold is formed taught as obvious by Lewis et al above, Lewis et al do not explicitly teach the first region of the ceramic mold to comprise a shell and the second region of the ceramic mold to comprise a core disposed in a cavity of the shell, or the first region of the ceramic mold comprises an inner region and the second region of the ceramic mold comprises an outer region and the process is controlled so that the inner region is denser than the outer region of the mold. However, they do teach a method of fabrication of dies and fabrication of fixtures for use in conventional high-volume production of articles (see citations for claim 18 above) that is capable of forming a mold having these specific features and that would have been obvious to one having ordinary skill in the art at the time the invention was made.

For claims 25 and 26, the previous combination does not teach using powder grain sizes of less than 30 micrometers.

However, Lewis et al teach using powder grain sizes of less than 30 micrometers (cl 13 lns 13-15 i.e. Powder sizes used in making articles with the three axis apparatus ranged from about 270 mesh (0.025 mm = 25 micrometers) to about 100 mesh (0.149 mm = 149 micrometers).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lewis et al with those of the previous

combination for benefit of producing shaped objects from established powder grain sizes.

For claim 28, further regarding a ceramic mold is formed taught as obvious by Lewis et al above, Lewis et al do not explicitly teach providing a surface in an inner region of the ceramic mold comprising a surface roughness different from an outer region of the ceramic mold. However, they do teach modifying surface roughness of the formed article (cl 21 lns 18-21 i.e. Rough surfaces might also be smoothed by laser ablation, using the laser in a pulsed mode to remove small amounts of material, or by passing the laser beam over the surface in order to melt a very thin surface layer) and it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a surface in an inner region of the ceramic mold comprising a surface roughness different from an outer region of the ceramic mold.

3. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Deckard, further in view of Sachs et al, further in view of Lewis et al, and further in view of Loschau (Ceramics: Getting into the 2000's, already of record).

The previous combination does not teach at least one of the powder mixes comprises at least one ingredient that affects densification and/or sintering of the powder by producing a liquid phase for at least one of the regions of the object.

However, in the same field of endeavor pertaining to producing ceramic objects by laser sintering, Loschau teaches the ceramic powder comprises at least one ingredient that affects densification and/or sintering of the ceramic powder by producing a liquid phase for at least one of the regions of the object (pg 568 paragraph 1 i.e.

Experiments are known on indirect laser sintering of Al2O3 and SiC with low-melting binder…).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Loschau with those of the previous combination for benefit of using more complex mixtures that would impart certain targeted properties to the produced ceramic object.

Response to Arguments

Applicant's arguments filed 8/6/09 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES SANDERS whose telephone number is 571-270-7007. The examiner can normally be reached on Monday through Friday, 8 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Del Sole can be reached on 571-272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JMS

/Joseph S. Del Sole/

Supervisory Patent Examiner, Art Unit 1791